APPENDIX 8A. USER INSTRUCTIONS FOR LCC AND PBP SPREADSHEETS

TABLE OF CONTENTS

APPENDIX 8A. USER INSTRUCTIONS FOR LCC AND PBP SPREADSHEETS

8A.1 INTRODUCTION

It is possible to examine and reproduce the detailed results of the life-cycle cost (LCC) and payback period (PBP) analyses using Microsoft Excel spreadsheets available on the U.S. Department of Energy's website at: http://www.eere.energy.gov/buildings/appliance_standards/. To fully execute the spreadsheets requires both Microsoft Excel and Crystal Ball software. Both applications are commercially available. Crystal Ball is available at http://www.decisioneering.com.

The six spreadsheets posted on the DOE website represent the latest versions and have been tested with Microsoft Excel 2000.

8A.1.1 Cooktops

The cooktop LCC and PBP spreadsheet or workbooks consist of the following worksheets:

LCC Summary	Contains the input selections and a summary table of energy use, operating costs, LCC, and Payback. This worksheet also works as an interface between user inputs and the rest of the worksheets -- do not modify this sheet.
RECS Households	For each RECS household being simulated, contains the equipment usage data by product class. Summary information for each building record is also provided.
Energy Use	Contains unit energy use data.
Equipment Price	Contains manufacturer price data for the considered design options. Also includes the manufacturer and retail mark-ups, sales tax, and installation price.
Energy Price	Contains regional electricity and natural gas prices for the reference year.
Energy Price Trend	Contains the electricity and natural gas price trends for the reference, high, and low economic growth scenarios based on AEO 2007.
Discount Rate	Contains data from which an average discount rate and a distribution of discount rates are determined.

Lifetime	Contains the survival function and average lifetime in years.

8A.1.2 Ovens

The oven LCC and PBP spreadsheet or workbooks consist of the following worksheets:

LCC Summary	Contains the input selections and a summary table of energy use, operating costs, LCC, and Payback. This worksheet also works as an interface between user inputs and the rest of the worksheets -- do not modify this sheet.
RECS Households	For each RECS household being simulated, contains the equipment usage data by product class. Summary information for each building record is also provided.
Energy Use	Contains unit energy use data.
Equipment Price	Contains manufacturer price data for the considered design options. Also includes the manufacturer and retail mark-ups, sales tax, and installation price.
Energy Price	Contains regional electricity and natural gas prices for the reference year.
Energy Price Trend	Contains the electricity and natural gas price trends for the reference, high, and low economic growth scenarios based on AEO 2007.
Discount Rate	Contains data from which an average discount rate and a distribution of discount rates are determined.
Lifetime	Contains the survival function and average lifetime in years.

8A.1.3 Microwave Ovens

The microwave Oven LCC spreadsheet or workbook consists of the following worksheets:

LCC Summary	Contains the input selections and a summary table of energy use, operating costs, LCC, and Payback. This worksheet also works as an interface between user inputs and the rest of the worksheets -- do not modify this sheet.

RECS Households	For each RECS household being simulated, contains the equipment usage data. Summary information for each building record is also provided.
Base Case Eff Dist	Contains microwave oven market share efficiency data.
Energy Use	Contains unit cooking energy use data.
Equipment Price	Contains manufacturer price data for microwave ovens for the considered design options. Also includes the manufacturer and retail mark-ups, sales tax, and installation price.
Energy Price	Contains regional electricity prices for the reference year.
Energy Price Trend	Contains the electricity price trend for the reference, high, and low economic growth scenarios based on AEO 2007.
Discount Rate	Contains data from which an average discount rate and a distribution of discount rates are determined.
Lifetime	Contains the survival function for microwave ovens and their average lifetime in years.

8A.2 BASIC INSTRUCTIONS

Basic instructions for operating the LCC spreadsheets are as follows:

1. Once you have downloaded the LCC file from the Web, open the file using Excel. At the bottom, click on the tab for sheet LCC Summary.

2. Use Excel's "View/Zoom" commands at the top menu bar to change the size of the display to make it fit your monitor.

3. The user interacts with the spreadsheet by clicking choices or entering data using the graphical interface that comes with the spreadsheet. Select choices from the various inputs listed under "User Options" heading.

4. Under the "User Options" heading, select choices from the selection buttons and boxes for the following: (1) type of calculation (Sample or Crystal Ball®), (2) energy price Trend, (3) start year, (4) efficiency market share scenario, and (5) manufacturing cost. A new discount rate or lifetime can also be entered if a value other than the default value or default distribution is wanted; however, this changes the code. As a result, the Department does not recommend saving the spreadsheet after the code is changed.

5. To change inputs listed under "User Input", select the input you wish to change by either clicking on the appropriate button or selecting the appropriate input from the input box.

6. This spreadsheet gives the user two types of calculation methods:
   a. If the "Sample Calc" is selected, then all calculations are performed for single input values, usually an average. The new results are shown on the same sheet as soon as the new values are entered.

   b. Alternately, if the "CB Calculation" is selected, the spreadsheet generates results that are distributions. Some of the inputs are also distributions. The results from the LCC distribution are shown as single values and refer only to the results from the last Monte Carlo sample and are therefore not meaningful. To run the distribution version of the spreadsheet, the Microsoft Excel® add-in software called Crystal Ball® must be enabled.

To produce sensitivity results using Crystal Ball, simply select Run from the Run menu (on the menu bar). To make basic changes in the run sequence, including altering the number of trials, select Run Preferences from the Run menu. After each simulation run, the user needs to select Reset (also from the Run menu) before Run can be selected again. Once Crystal Ball has completed its run sequence it will produce a series of distributions. Using the menu bars on the distribution results, it is possible to obtain further statistical information. The time taken to complete a run sequence can be reduced by minimizing the Crystal Ball window in Microsoft Excel. A step-by-step summary of the procedure for running a distribution analysis is outlined below:

1. Find the Crystal Ball toolbar (at top of screen)

2. Click on Run from the menu bar

3. Select Run Preferences and choose from the following choices:
   a. Monte Carlo[a]
   b. Latin Hypercube (recommended)
   c. Initial seed choices and whether you want it to be constant between runs
   d. Select number of Monte Carlo Trials (DOE suggests 10,000).

4. To run the simulation, follow the following sequence (on the Crystal Ball toolbar)

   Run
   Reset
   Run

5. Now wait until the program informs you that the simulation is completed.

---

[a] Because of the nature of the program, there is some variation in results due to random sampling when Monte Carlo or Latin Hypercube sampling is used.

The following instructions are provided to view the output generated by Crystal Ball.

1. After the simulation has finished, to see the distribution charts generated, click on the Windows tab bar that is labeled Crystal Ball.

2. The life-cycle cost savings and payback periods are defined as Forecast cells. The frequency charts display the results of the simulations, or trials, performed by Crystal Ball. Click on any chart to bring it into view. The charts show the low and high endpoints of the forecasts. The View selection on the Crystal Ball toolbar can be used to specify whether you want cumulative or frequency plots shown.

3. To calculate the probability that a particular value of LCC savings will occur, either type 0 in the box by the left arrow, or move the arrow key with the cursor to 0 on the scale. The value in the Certainty box shows the likelihood that the LCC savings will occur. To calculate the certainty of payback period being below a certain number of years, choose that value as the high endpoint.
4. To generate a printout report, select Create Report from the Run menu. The toolbar choice of Forecast Windows allows you to select the charts and statistics in which you are interested. For further information on Crystal Ball outputs, please refer to Understanding the Forecast Chart in the Crystal Ball manual.